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EXAMINER

VINH, LAN

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| ART UNIT | PAPER NUMBER |
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1765

DATE MAILED: 05/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/989,050

Applicant(s)

BOHN ET AL.

Examiner

Lan Vinh

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 November 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4, 5. 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 23 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The limitation of "a thickness sufficient to permit nucleation that forms nanometer size metal particles and small enough to prevent formation of a continuous metal layer.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 7, 18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 7, 18 are indefinite for use of improper Markush language. The examiner suggests replacing "selected from the group" with --selected from the group consisting of--

3. For the purpose of examination, the claim language of "a thickness sufficient to permit nucleation that forms nanometer size metal particles and small enough to prevent formation of a continuous metal layer" is best understood by the examiner as a thickness in the nanometer size.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-8, 10, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peng et al (US 5,895,223) in view of Przybysz (US 4,353,779)

Peng discloses a method of etching nitride (GaN/Group III-V material). This method comprises the steps of:

partially coating the GaN chip with a metal electrode/layer of Pt (col 4, lines 7-18), which reads on depositing a thin discontinuous layer of metal on a Group III-V material surface

etching the GaN chip in a acidic solution of H_3PO_4 , no voltage bias is required for the etching (col 4, lines 4-42), which reads on etching the Group III-V material surface in acidic solution, the etching being conducted without external electrical bias.

Unlike the instant claimed inventions as per claims 1, 8, Peng does not disclose etching the Group III-V material in a HF and oxidant solution.

However, Przybysz discloses a method for wet chemical etching of Group III/V material comprises the step of etching Group III/V material (Ga) in a solution containing HF and H₂O₂/oxidizer for a period of 60 minutes (col 1, lines 60-65, col 4, lines 10-11)

Since both Peng and Przybysz are directed at methods of etching Group III/V material in an acidic solution, one skilled in the art would have found it obvious to modify Peng etching step by using the etching solution as taught by Przybysz because Przybysz states that the amount of F⁻ ion being effective to allow sharp uniform etching without precipitation or gaseous evolution at the etching site and the etching solution acts as a particularly effective solvent solution for GaAs/Group III/V material (col 5-11)

Regarding claim 2, Peng discloses that in one embodiment of his invention, the activation of the etching liquid by the UV light /illumination must be avoided (col 3, lines 56-58)

Regarding claim 3, Peng discloses the step of using UV light /illumination during the etching step (col 3, lines 43-45)

Regarding claims 4-7, Peng discloses that the metal electrode can be Pt, Au, Pd (col 4, lines 117-19)

The limitation of using an oxidizer of H₂O₂ in the etching solution, as recited in claim 8, has been discussed above.

The limitations of claim 10 (etching time) and claim 11 have also been discussed above.

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6. Claims 9, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peng et al (US 5,895,223) in view of Przybysz (US 4,353,779) and further in view of Yoshikawa et al (US 5,990,605)

Peng as modified by Przybysz has been described above. Unlike the instant claimed invention as per claim 9, Peng and Przybysz do not specifically disclose that the thickness of the metal is less than 10 nm.

However, Yoshikawa disclose a method of forming electron device comprises the step of forming an electrode layer of Pt having a thickness of from 2 –20nm (overlaps the claimed range) (col 7, lines 53-55)

Since Peng discloses a step of forming a electrode layer of Pt, one skilled in the art would have found it obvious to modify Peng and Przybysz by forming a metal/Pt layer having a specific thickness as per Yoshikawa because Yoshikawa teaches that a thickness of 2-20 nm is the most suitable for the Pt thin-film electrode (col 7, lines 53-55)

7. Claims 12-19, 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peng et al (US 5,895,223) in view of Przybysz (US 4,353,779)

Peng discloses a method of etching nitride (GaN/Group III-V material). This method includes the steps of:

partially coating the GaN chip with a metal electrode/layer of Pt (col 4, lines 7-18), which reads on depositing a thin discontinuous layer of metal on a Group III-V material surface

etching the GaN chip in a acidic solution of H_3PO_4 , no voltage bias is required for the etching (col 4, lines 4-42), which reads on etching the Group III-V material surface in acidic solution , the etching being conducted without external electrical bias.

Since Peng does not disclose performing any additional step beside the above-mentioned steps, Peng method reads on the method consisting of the two steps.

Unlike the instant claimed inventions as per claims 12, 21, Peng does not disclose etching the Group III-V material in a HF and oxidant solution for a period of about 2 sec up to 60 minutes.

However, Przybysz discloses a method for wet chemical etching of Group III/V material comprises the step of etching Group III/V material (Ga) in a solution containing HF and H_2O_2 /oxidizer for a period of 60 minutes (col 1, lines 60-65, col 4, lines 10-11)

Since both Peng and Przybysz are directed at methods of etching Group III/V material in an acidic solution, one skilled in the art would have found it obvious to modify Peng etching step by using the etching solution for a period as taught by Przybysz because Przybysz states that the amount of F- ion being effective to allow sharp uniform etching without precipitation or gaseous evolution at the etching site and the etching solution acts as a particularly effective solvent solution for GaAs/Group III/V material (col 5-11)

Regarding claim 13, Peng discloses that in one embodiment of his invention, the activation of the etching liquid by the UV light /illumination must be avoided (col 3, lines 56-58)

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Regarding claim 14, Peng discloses the step of using UV light /illumination during the etching step (col 3, lines 43-45)

Regarding claims 15-18, Peng discloses that the metal electrode can be Pt, Au, Pd (col 4, lines 117-19)

The limitation of using an oxidizer of H_2O_2 in the etching solution, as recited in claim 19, has been discussed above.

The limitations of claim 21 (etching time) and claim 22 have also been discussed above.

8. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Peng et al (US 5,895,223) in view of Yoshikawa et al (US 5,990,605) and further in view of Przybysz (US 4,353,779)

Peng discloses a method of etching nitride (GaN/Group III-V material). This method comprises the steps of:

partially coating the GaN chip with a metal electrode/layer of Pt (col 4, lines 7-18), which reads on depositing metal on a Group III-V material surface

etching the GaN chip in a acidic solution of H_3PO_4 , no voltage bias is required for the etching (col 4, lines 4-42), which reads on etching the Group III-V material surface in acidic solution , the etching being conducted without external electrical bias.

Unlike the instant claimed invention as per claim 23, Peng does not specifically disclose that the thickness of the metal is a thickness sufficient to permit nucleation that

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forms nanometer size metal particles and small enough to prevent formation of a continuous metal layer/the nanometer size thickness

However, Yoshikawa disclose a method of forming electron device comprises the step of forming an electrode layer of Pt having a thickness in the nanometer size of from 2 –20nm (overlaps the claimed range) (col 7, lines 53-55)

Since Peng discloses a step of forming a electrode layer of Pt, one skilled in the art would have found it obvious to modify Peng by forming a metal/Pt layer having a specific thickness as per Yoshikawa because Yoshikawa teaches that a thickness of 2-20 nm is the most suitable for the Pt thin-film electrode (col 7, lines 53-55)

Peng and Yoshikawa do not disclose etching the Group III-V material in a HF and oxidant solution for a period of about 2 sec up to 60 minutes.

However, Przybysz discloses a method for wet chemical etching of Group III/V material comprises the step of etching Group III/V material (Ga) in a solution containing HF and H₂O₂/oxidizer for a period of 60 minutes (col 1, lines 60-65, col 4, lines 10-11)


Since Peng is directed to a method of etching Group III/V material in an acidic solution, one skilled in the art would have found it obvious to modify Peng and Yoshikawa by using the etching solution for a period as taught by Przybysz because Przybysz states that the amount of F⁻ ion being effective to allow sharp uniform etching without precipitation or gaseous evolution at the etching site and the etching solution acts as a particularly effective solvent solution for GaAs/Group III/V material (col 5-11)

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 703 305-6302. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on 703 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are 703 872-9310 for regular communications and 703 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308-0661.



LV
May 8, 2003